



DRAFT

**Materials Management Plan
Interstate-70 Open Channel Drainage aka Montclair Creek**

July 2014

Prepared for:
**U.S. Environmental Protection Agency
1595 Wynkoop St
Denver, CO 80202**



City and County of Denver
Department of Environmental Health
Environmental Quality Division
200 West 14th Avenue, Department 310
Denver, Colorado 80204
720-865-5439

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1 Project Area

Acronyms

ASARCO	American Smelting and Refining Company
AOC	Administrative Order on Consent
CDOT	Colorado Department of Transportation
CDPHE	Colorado Department of Public Health and Environment
CFR	Code of Federal Regulations
LDR	Land Disposal Restrictions
MMP	Materials Management Plan
OSHA	Occupational Safety and Health Administration
OU 2	Operable Unit 2
OVA-FID	Organic Vapor Analyzer-Flame Ionization Detector
ppm	parts per million
RI/FS	Remedial Investigation/Feasibility Study
USEPA	United States Environmental Protection Agency
VB/I-70	Vasquez Boulevard/Interstate-70 Superfund Site

1.0 Introduction

This Materials Management Plan has been developed by CTL/Thompson, Inc. (CTL) and the City and County of Denver (the "City") to outline preventive measures and guidelines for managing subsurface materials associated with the construction of the proposed open channel drainage (the "Project"). The Project ~~A portion of~~ will go through the Denver Coliseum ~~and~~ Globeville Landing Park, which are located within Operable Unit Number 2 ("OU 2") of the Vasquez Boulevard/Interstate 70 ("VB/I-70") Superfund Site.

The Denver Coliseum parking lot is also constructed over an unpermitted landfill, which is believed to encroach into at least the north portion of the Globeville Landing Park. These properties are owned by the City.

Because the exact boundaries of the landfill are uncertain, this MMP will apply to the entire Project. The Project starts at the south side of the Coliseum building and will follow the contours of McFarland Drive around the southern edge of the parking lot until Arkins Court, at which time there will be a turn to the left, cutting through Globeville Landing Park to the river just north of the existing outfall. The channel will be "naturally" engineered approximately 10 feet deep and 140 feet wide. Figure 1 shows the approximate alignment of the Project.

This MMP contains guidelines in general conformance with applicable regulatory statutes and procedures.

It should be noted that the document Wastewater Capital Projects Management Standard Construction – 14.0 Removal and Disposal of Construction Debris and Contaminated Materials, is to be used in conjunction with this MMP.

However, the following Sections of the Specification conflict with this MMP, and thus are waived or an explanation provided as follows:

- 14.0.3 Environmental Consultant: This indicates that the City and County of Denver shall have an Environmental Consultant under contract. This section is considered waived and it is the responsibility of the Contractor to provide at least one Field Materials Management Representative for oversight during work performed for the Project, and this is discussed further in this MMP
- 14.0.5 Submittal (OSHA Requirements): This indicates in #6 that Disposal Profile Sampling is to be performed. While this is generally true if new wastes are encountered, some waste disposal profiling has already occurred and, this is discussed further in this MMP.
- 14.0.7.1 Removal: Discusses additional removal and inspection of contaminated materials; this section is waived.
- 14.0.7.3 Confirmation Sampling: #1 is waived because the Contractor is not expected to "chase" contamination and confirm full cleanup. #2 is still

applicable in that a Sampling and Analysis Plan is still necessary, in the event that sampling is needed for new waste profiles or other reasons.

- 14.0.7.4 Field Testing: #4 is waived, again with the reasoning that responsible management of contaminated materials encountered is the expectation, but that chasing contaminants and confirming cleanup are not.
- 14.0.7.4 Protection of Storm and Sanitary Sewers: is deleted in full.

1.1 Site History and Description

This project is located near the original location of the Omaha & Grant Smelter, which was built in 1882 and operated until 1902. The Omaha & Grant Smelter facility was built on approximately 50 acres bordering the South Platte River located south of Interstate 70 and south of the existing Denver Coliseum. The smelter was closed in 1903 and the smelter buildings were subsequently demolished.

Over the years, the City gradually acquired and sold parcels of land that had formerly been used for various aspects of smelter operations. The land beneath the Coliseum was used as a dump site, presumably during the first half of the century and prior to any environmental permitting requirements. The Coliseum was then constructed in the early 1950s.

1.2 Potential Risk from Subsurface Contaminants at the Site

The USEPA's findings concerning the VB/I-70 site identify the contaminants of concern ("COCs") as Lead and Arsenic from the former smelting operations. These findings have been corroborated through field investigations performed in the vicinity by the Colorado Department of Transportation ("CDOT") and Pepsi Bottling Group. These investigations are extensive and difficult to encapsulate in this document, so we instead have summarized recent studies that are specific to the Project, below.

Brown and Caldwell and CTL conducted soil and ground water studies in 2010 and 2011. These studies focused on soil and ground water sampling via drilling, and revealed similar findings. The findings included the following contaminants, particularly in the landfill area beneath the Coliseum parking lot:

- Landfill debris, including asbestos and Polynuclear Aromatic Hydrocarbons (PAHs) in soil;
- Methane gas;
- Petroleum hydrocarbons in soil;
- Arsenic and Lead in the soil;
- Arsenic, Cadmium, Iron and Manganese in the ground water; and,
- Chlorinated solvents in the ground water

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Test pits were also performed in the Coliseum parking lot by CTL in May 2013, as drilling can be limited or inconclusive when evaluating and planning for asbestos. The five (5) test pits revealed friable asbestos in each pit.

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Four (4) additional borings were advanced by CTL in September 2013, solely for the purpose of characterizing the soils along the alignment for proper waste disposal. This study focused on the alignment above the landfill, as a Waste Management representative had indicated that they had sufficient information from the landfill area and that the higher segments of the project closer to the surface were not as well characterized. —Soils from each boring were homogenized and analyzed via the Toxicity Characteristic Leaching Procedure (TCLP) for Lead, Arsenic and Chromium, to determine if the leachable component of these metals would be high enough to be classified as "hazardous", and therefore require disposal at a hazardous waste (Subtitle C) landfill. The results of our borings indicate that, when averaged as one waste stream, the TCLP concentrations of the soil were within non-hazardous concentrations, and are expected to be approved for disposal at a Subtitle D landfill.

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Although waste management site workers are considered to be the primary focus of this MMP, guidelines are also included for the protection of workers and work-site visitors who may potentially be exposed to contaminants from the Project. More specific details for worker protection, such as use of respirators and other PPE, emergency contacts, evacuation procedures, and other details can be found in the site-specific Health & Safety Plan prepared by the Contractor. Work-site visitors are considered to be those people who have job-related reasons for being in close proximity to the work site. This MMP is not intended to provide guidelines for the protection of the public in general, or people who may be in close proximity to the work site for reasons that are not job-related.

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2.0 Materials Management Plan Goals

The goals of this Materials Management Plan are:

- To provide guidelines to prevent unnecessary contact with, and spread of, site workers and work-site visitors from coming into contact with potentially contaminated subsurface materials such as soils and former smelter materials, demolished building foundations, debris, and methane. Asbestos is also expected to be encountered and is discussed in the City of Denver Standard Operating Procedures which is included as Appendix A to this MMP. The City of Denver Standard Operating Procedures (SOP) for asbestos in soils is included by reference as an integral part of this MMP.
- To facilitate the proper management and disposal of exposed and excavated soils, debris, and former smelter materials.

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2.1 Proper Management of Exposed Subsurface Material

The Project will disrupt the surface cover of sod and pavement (sometimes referred to as “caps and barriers”) at the Site. Subsurface materials brought to the surface will need to be handled appropriately to maintain a safe work environment and ensure that any smelter-related or other chemicals which may be present will not spread to other media.

Worker and work-site visitor health and safety guidelines and requirements are the responsibility of the ~~Operator/~~Contractor performing the intrusive work. ~~The~~ Typically, the ~~Operator/~~Contractor will develop and adhere to a Health and Safety Plan developed for the Site and work being performed. The plan will comply with Occupational Safety and Health Administration (OSHA) regulations, 29 Code of Federal Regulations (CFR) 1910.120. In addition, the ~~Operator/~~Contractor, as part of other expected permit processes for excavation, will be required to describe procedures to be used to address dust, erosion and sediment control for the Project.

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3.0 Affected Activities and Responsible Personnel

For the purpose of this MMP, the “Project” is defined as all privately-owned and City-owned property that will be disturbed by installation of the Phase 2 High Street Outfall Storm Sewer. All activities within the Project shall be subject to the conditions and requirements of this MMP. These activities are expected to be performed by City Operating Divisions (such as Parks and Recreation, and Public Works), and/or outside contractors (these entities are referred to generically as “Operators” in this Plan). In the sections that follow, examples of the types of intrusive activities that can be performed by these Operators are discussed, as well as the titles and responsibilities of key personnel.

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3.1 Affected Activities

Any intrusive work to be performed for the Project must follow proper City permitting procedures and the requirements and procedures of this MMP. For the purpose of this MMP, intrusive work is defined as any and all activities that result in penetration of the existing caps and barriers and can include the following activities:

- Any excavation below grade.
- Pavement removal/replacement.
- Compaction grouting / concrete injection
- Utility cuts (municipal, private services or contractor), including but not limited to the following:
 - Irrigation lines and other appurtenances in Globeville Landing Park (City of Denver)

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- Water (Denver Water)
- Natural Gas (Xcel Energy)
- Electric (Xcel Energy)
- Steam (Xcel Energy)
- Telephone (Qwest, AT&T, MCI, etc.)
- Cable television (AT&T, etc.)
- Sanitary sewer (City of Denver)
- Storm sewer (City of Denver)
- New service/repair/modification

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- 1. Traffic control cuts (e.g. signal poles, sensor devices, etc.).
- * Routine curb and gutter removal/replacement.
- * Accidental or catastrophic damage to pavement or curb and gutter as a result of human error or act of God.
- * Park maintenance below the existing sod.
- * Emergency response activities related to any or all of the above.

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3.2 Responsible Personnel

The following sections describe the titles and responsibilities of key personnel who oversee and implement this Materials Management Plan.

All workers directly involved with trenching, or construction within the trench, must have 40 hours of OSHA general training and ~~8 hours of supervisor training in accordance with 29 CFR 1910.120 ("Hazardous Waste Operations and Emergency Response")~~

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3.2.1 Program Administrator

~~The Program Administrator shall be a person in the Environmental Services Division of the City and County of Denver's Department of Environmental Health, as appointed by the Director of Environmental Services or the Director's designated representative. The Program Administrator shall have appropriate safety training and experience in accordance with OSHA Regulation 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response" paragraph (e)(4) "Management and supervisor training", and shall be the individual who is responsible for special permits determinations (Section 4.0) and coordination of the MMP components.~~

3.2.1.2 Program Monitor

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~~The Program Monitor shall be a designated person of the outside contractor in the Department of Environmental Health who monitors the public health issues associated with the Management Plan this MMP, acts as a liaison with regulatory entities on regulatory matters, serves as a point of contact for employee concerns related to risks to individual workers, and handles public inquiries regarding health concerns related to the Site. This person may or may not be the contractor's existing, in-house Health and Safety Officer.~~

3.2.3 Division Coordinators

Division Coordinators are the day-to-day representatives for each City Operational Division or public utility. These individuals will verify the proper implementation of the Management Plan for projects conducted at the Site under the charge of their division and serve as points of contact when anomalous conditions are encountered in the field. In addition, the Division Coordinators will coordinate work efforts among all relevant City divisions and departments, utilities and/or outside contractors. The Division Coordinators, by combination of education, work experience, and supplementary training shall be uniquely qualified to:

- Identify and administer special requirements for performance of work activities at the Site.
- Have working knowledge of activities conducted by or under the auspices of various City Departments (to include those activities conducted by private utilities and outside contractors).

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Specific duties of the Division Coordinators include:

____ Verify and document that all appropriate individuals and Work Supervisors have reviewed this MMP and fully understand its contents and required procedures.
- Collect and consolidate all applicable job site compliance forms, such as Worker Affidavits, Health and Safety Plan, and Worker Exposure Records, received from the project Work Supervisor and forward this information to the Program Administrator.

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3.2.24 Work Supervisor

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Job site compliance with the requirements of this MMP rests with the Work Supervisor. The Work Supervisor will be an employee of the outside contractor. Specific responsibilities of the Work Supervisor include:

- ____ Compliance with this MMP.
- ____ Communication of the requirements of this MMP to the work crew.
- Providing a brief informational presentation to all members of the
- assigned work crew.
- ____ Forwarding applicable job site compliance records to the Program Monitor/Division Coordinator.

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Comment [DH1]: One time? Daily?

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Comment [DH2]: How frequently?

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Accordingly, the Work Supervisor must have working knowledge of the activities performed by various City Departments, public utilities, and outside contractors

3.2.35 Field Materials Management Representative/Environmental Representative

The outside contractor/City shall also appoint or retain at least one Field Materials Management Representative for oversight during work performed for the Project. This person can also be known as the Environmental Representative or Environmental Professional, and may or may not be qualified to perform the asbestos consulting and oversight duties as described in the Denver SOP (Appendix A).

Comment [DH3]: I'm not seeing a relationship that ties the outside contractor back to the city and holds them accountable

The Field Materials Management Representative(s) shall have the authority to:

- Oversee work activities relating to the proper management of exposed
- subsurface materials.
- Stop operations when conditions change to ensure that materials management procedures are adequate.

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The Field Materials Management Representative, by a combination of education, work experience, and supplementary training shall have the following minimum qualifications:

- ~~An associate degree or~~ Two or more years of experience study in the physical sciences, engineering,
 - ~~-or a health-related field.~~
- ~~Completion of 40-hours of OSHA general training and 8 hours of supervisor training in accordance with 29 CFR 1910.120 ("Hazardous Waste Operations and Emergency Response") and possession of certification thereto, including annual~~
 - ~~-maintenance of certification.~~
- ~~Participation and certification of Medical Monitoring in accordance with 29 CFR 1910.120.~~

The responsibilities of the Field Materials Management Representative are:

- ~~Oversight sufficient to ensure proper management of excavated materials.~~
- ~~To compile written documentation of all material handling and disposal.~~
 - ~~tion. This information shall be maintained by the contractor in Department of Environmental Health files with duplicate copies provided to the Program Administrator.~~

3.2.4 Record Keeping

~~The Program Administrator and Program Monitor shall maintain complete file documentation of all environmental, health, and safety activities conducted on the Site. Examples of documentation include Work Orders, Special Conditions Forms/Permits, Worker Affidavits, Site Monitoring Records, Worker Exposure Records, daily records of the Field Materials Management Representative, Laboratory results of debris and media encountered during the project, and Hazardous Waste Disposal Manifests.~~

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4.0 Excavation Procedures

This Section discusses the following:

- ~~Material/Waste management methods and procedures for managing and/or disposing of excavated materials, any produced groundwater,~~
 - ~~-and preventing contaminant spread.~~
- ~~Decontamination procedures for personnel, sample equipment, and heavy equipment.~~

It shall be the responsibility of the Operator to prepare a Site-specific Health and Safety Plan (HASP). A HASP is typically required when proposed work activities are

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likely to encounter contaminated soil, ground water or smelter-related waste. Compliance with the health and safety plan will be the sole responsibility of the Operator ~~(outside contractor)~~. It will also be the responsibility of the Operator to ensure that all workers assigned to the permitted work effort have received adequate training in accordance with 29 CFR 1910.120.

Comment [DH4]: This terminology is inconsistent with earlier in the plan

Comment [DH5]: This is the correct terminology

The Work Supervisor shall provide a brief informational presentation to all members of the assigned work crew prior to work initiation discussing the major aspects of this MMP, specifically the reasons for the procedure, operational considerations, and materials handling procedures.

Upon completion of the presentation, each member of the work crew shall sign an affidavit (Worker Affidavits) attesting to his/her awareness and understanding of the procedures. The Work Supervisor shall have this available upon request from the City. ~~forward a copy of all affidavits to the Division Coordinator within 10 business days.~~

The Field Materials Management Representative (Field Rep) may observe and document all field activities through and including disposition (removal from the job site) of materials encountered. The Field Rep shall have the authorities and responsibilities as defined in Section 3.2.3~~5~~ of this document.

4.1 Work Site Photograph Documentation

Photographs of the work site may be taken prior to, during, and after completion of work, at the discretion of the Field Materials Management Representative. If photographs are taken, they will be logged in an appropriate form (i.e., notebook, logbook) and will include the contents of the photograph, date of photograph, and any other pertinent information.

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4.2 Observation of Special Conditions During Excavation

In all cases where intrusive work is performed, the Work Supervisor and site workers need to be aware of special conditions that may trigger changes to materials management at the Site as well as the health and safety precautions being employed. Soil with apparent chemical staining or odors (discussed later), by itself is not considered an unusual or special condition. These special conditions may include, but not be limited to:

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- Drums, cans, or other bulk containers potentially containing chemicals;
- Explosives or ammunition;
- Methane gas (immediate inhalation or flammability hazard); and
- Asbestos containing materials (inhalation hazard). See City SOP in Appendix A.

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If these conditions are encountered, excavation will stop immediately and the ~~Field Materials Management Representative Rep~~ will be notified. The ~~Field Materials Management Representative Rep~~ will in turn notify the Supervisor and Project Monitor if these individuals are not already aware. Program Monitor and Program Administrator. ~~The Field Materials Management Representative Rep~~ will determine the actions to be taken at the Site, which may include, but not be limited to:

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- Segregation and/or restricting access to the items(s) in question;
- Sample collection and analysis;
- Additional work-site documentation, such as obtaining photos, GPS
 - coordinates, and depth of the item or condition; and/or,
 - Methane mitigation procedures, such as employment of air movers/-ventilation.

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Modifications that may be warranted to the health and safety precautions being employed at the Site are the sole responsibility of the Operator. The Operator may elect to ~~develop (if necessary) or modify the Site-specific health and safety plan~~ HASP based on the observed conditions. In addition, the Operator may elect

to collect additional samples for clarification determination of proper health and safety requirements during the project.

4.3 Solid Material/Waste Management

~~Until otherwise amended, this~~ This MMP assumes that much of the all excavated material will be disposed of off-site; however, soils away from the Denver Coliseum parking lot, if deemed appropriate by the Field Rep, may potentially be and not re-used onsite. As discussed previously, bBased on sampling activity to date, most if not all of the disposed excavated material is expected to be disposed off-site at a Subtitle D (non-hazardous) landfill, planned to be -such as the Denver Arapahoe Disposal Site (DADS) operated by Waste Management. At this time, waste profiles have not yet been completed and approved by Waste Management, so this will need to occur before these assumptions are confirmed. it is not assumed that any quantity of excavated material will require disposal at a Subtitle C (hazardous) landfill. Excavated material is expected to include, but not be limited to, any of the following items:

- Native sand, silt, clay, and bedrock;
- Dark stained soils, potentially containing chemical contaminants such
 - -as petroleum compounds or coal based fill;
- Construction and demolition debris such as concrete, wood, and brick;
- Suspect or confirmed asbestos type building debris, such as transite,
 - -insulation, plaster, floor tile, or roofing (see Appendix A – SOP);
- Dumped items such as bottles, cans, tires, newspaper, clothes ; and/or,
- Smelting waste such as slag.

One of the roles of the onsite ~~field representative~~ Field Rep will be to assist in the management and designation of the waste. The ~~Field Representative~~ may periodically request work stoppage to better identify soils or debris. The waste is not expected to be homogenous, so it is unlikely that there will be loads that can be considered, as an example, 100% concrete rubble (which might otherwise carry a potentially lower disposal fee). The City and County of Denver - Department of Environmental Health (DEH) has obtained approval from DADS for three waste disposal profiles. Waste will generally be loaded out under one of the following ~~six~~ categories / waste profiles, as follows:

- 1. Landfill material - with friable asbestos – Profile 113898CO

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- ~~Soil with metals contamination~~ ~~Debris with likely chemical waste,~~
with non friable asbestos;

•2. ~~no asbestos~~ – Profile 114005CO

Railroad ties

- ~~Debris with likely chemical waste, with friable asbestos;~~
- ~~Debris with likely chemical waste, with non friable asbestos;~~

•3. ~~no asbestos~~ – Profile 114003CO

4. ~~Construction debris~~ – No profile needed, provided it is typical construction debris, with no asbestos nor chemical or metals contamination

There will be a total of six ~~may be additional~~ waste profiles created during the project, if for example, the Field Rep observes new waste items, and after segregating and sampling, finds that the waste is significantly different to qualify as a new waste stream. In the event that new waste items or characteristics are uncovered, the City and County of Denver Public Works Project Manager should be contacted. In addition, DEH should be notified for possible assistance in the creation of new profiles. ~~one for each category that will be approved prior to commencement of the project.~~

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It is assumed, based on test pit information, that the vast majority of soils in the Coliseum/Landfill Area will be handled and disposed under #1 - Landfill material - with friable asbestos. The possibility of encountering asbestos within the areas away from the Coliseum is at this time considered much less likely, but possible. ~~No new profiles are expected to be created unless the representative observes characteristics or features that are sufficiently different from what has thus far been documented, to warrant a new profile. The Field Representative will use a Photoionization Detector (PID) and be experienced at using olfactory and visual cues to identify chemical contaminants such as petroleum impacts, TCE/PCE, coal ash (commonly synonymous with PAHs), and slag.~~ Again, refer to Appendix A for proper identification, loading, monitoring, and packaging of asbestos waste. Generally speaking, stockpiling of asbestos - contaminated soils (ACS) is to be avoided; ACS should be excavated only when all necessary abatement crews, trucks, and other equipment are available for direct load and immediate disposal.

It should be noted that DADS shall be given 4 weeks prior to commencement of excavation, because preparations will need to be made at the landfill. This is because the presence of chemical and asbestos

contaminants together is atypical, and requires placement of this waste in a pre-designated area within the lined area of the landfill.

4.4 Screening and Assessment of Waste

The Field Rep will use a Photoionization Detector (PID) and Combustible Gas Indicator (CGI) and be experienced at using olfactory and visual cues to identify chemical contaminants such as petroleum impacts, TCE/PCE, coal ash (commonly synonymous with PAHs), and slag.

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Prior to beginning excavation, the contractor will provide 6-mil polyethylene lined roll-off containers, with covers, for short-term stockpiling of soils and wastes. A dedicated lined and covered container will be used if the Field Rep believes that the waste appears different or is not otherwise appropriate for direct load into a truck under pre-approved waste profile. This scenario is expected to become more prevalent away from the Coliseum, where there is expected to be more interpretation by the Field Rep as to the nature of the waste. Each container will be covered at the end of each work day. The contractor will provide an adequate number of roll-off containers to avoid down time.

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The Field Rep will observe the excavation and may at times request the excavator to place waste materials into a lined container, or on bermed, 6-mil polyethylene sheeting (both types of temporary containment should be available), for waste characterization. In addition, the Field Rep will monitor the ambient air near the excavator bucket using a PID and CGI.

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4.4.1 PID Readings

PID readings less than 10 ppm are not unusual and can be indicative of vehicle exhaust and other factors, so low PID readings alone should be interpreted with some discretion by the Field Rep. This MMP does not state a threshold where action should be taken based on PID readings. The PID readings and site conditions will be taken into account together by the Field Rep in making interpretations as to whether air conditions are potentially hazardous.

4.4.2 CGI Readings

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If greater than 10 percent of the lower explosive limit (LEL) is measured at any time, (0.5% Methane) the work area will be evacuated and work practices will be re-evaluated. Work will not resume until the ambient air contains less than 10% of the LEL. See Section 4.6 on Methane Mitigation.

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4.4.3 Containers and Other Unidentified Items

Drums, containers, explosives, medical waste, and other special items may be encountered. If any such items are encountered within the excavation, a multiple step assessment will be performed:

1. The Field Rep will assess containers, in-situ, for likely chemical content based on labeling, container type/shape, observation of contents, etc. Potentially contaminated soils will be assessed based on nearby chemical containers, if present, or based on field screening observations.
2. The Field Rep will otherwise attempt to identify, if possible, the nature of the item, whether it appears to be medical waste, a piece of machinery from smelting or other industrial operations, ammunition, or other item.
3. The Field Rep will use a PID and CGI to measure ambient air at (or as close as safely possible) the location for volatiles and combustible gases.
4. The container or item will be observed for crystallization or other evidence of reactively unstable materials. Reactively unstable materials are considered unlikely, but if present, they will not be moved until they can be chemically or physically stabilized.
5. If the condition of a container or item can be assessed in place, the Field Rep will note the condition of the object, evidence of releases, etc. If a container appears to be actively leaking, it will not be removed until a suitable overpack container is available for containment.
6. Sampling may be required by the Field Rep if, after instrument readings, observation, and other factors, the Field Rep determines that he/she can obtain a sample safely.
7. The Field Rep will observe and document whether releases, if any, appear likely to have impacted soils or other wastes around or below the container or item. If a suspected release has occurred, the extent of the release will be assessed by excavating around the point of the release. Where contaminated soils are observed, it will

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<p>be assumed that the soils have been impacted by containers located physically above or adjacent to the location of the observed contamination, regardless of the presence of visible leakage from each container.</p>	<p>Formatted: Font: 12 pt, Not Bold</p>
<p>8. The location will be measured from a fixed reference point and plotted on a scaled drawing; if it is practical, the location will be marked in the field with flagging or stakes.</p>	<p>Formatted: Indent: Left: 1", No bullets or numbering</p> <p>Formatted: Indent: Left: 0.5", Hanging: 0.5", Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5", Don't allow hanging punctuation, Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers, Font Alignment: Baseline</p>
<p>9. The Field Rep will take photograph(s) documenting the location and general condition of the feature;</p>	<p>Formatted: Font: (Default) Arial</p>
<p>10. If in the judgment of the Field Rep, the container or other item can be moved safely, the Field Rep will request the excavator to place the waste material into a lined container. This is expected to be a collaborative effort, and if the item remains unknown with the potential to release a hazardous or petroleum substance, other onsite personnel should be consulted to determine if there are objections.</p>	<p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Indent: Left: 1", No bullets or numbering</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Indent: Left: 0.5", Hanging: 0.5", Numbered + Level: 1 + Numbering Style: 1, 2, 3, ... + Start at: 1 + Alignment: Left + Aligned at: 0.25" + Indent at: 0.5", Don't allow hanging punctuation, Don't adjust space between Latin and Asian text, Don't adjust space between Asian text and numbers, Font Alignment: Baseline</p>
<p>11. If there is no consensus that the project can continue safely because of an unidentifiable container, condition, or other item, work shall stop and the Denver Department of Environmental Health shall be contacted and made aware of the situation.</p>	<p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Indent: Left: 1", No bullets or numbering</p>
<p>12. Containers and other special items will be segregated based on general waste types, media, and waste disposal requirements (e.g., Petroleum contaminated soil, would be segregated into a separate stockpile from soils excavated below a leaking drum of chlorinated solvent).</p>	<p>Formatted ...</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Font: (Default) Arial</p>
<p>13. Waste Management may need to be contacted when encountering unknown items, for guidance on characterizing and segregating items for disposal.</p>	<p>Formatted ...</p> <p>Formatted ...</p> <p>Formatted ...</p> <p>Formatted ...</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Font: 12 pt, Not Bold</p>
<p>14. At no time shall unknown containers or other items, that are sealed and have the potential to contain a hazardous substance or create a hazardous condition, be assumed to be non-hazardous and combined with soil or non-hazardous debris to be disposed.</p>	<p>Formatted: Font: (Default) Arial</p> <p>Formatted ...</p> <p>Formatted ...</p> <p>Formatted ...</p> <p>Formatted ...</p>
<p>4.4.4 Soil Characterization</p>	<p>Formatted: Font: 12 pt, Not Bold</p> <p>Formatted: Indent: Left: 0"</p> <p>Formatted ...</p> <p>Formatted: Font: Book Antiqua, 11 pt, Bold</p>

Asbestos wastes will be managed per the SOP. Soils impacted with petroleum solvents, slag, and/or coal ash are assumed prior to bid to be profiled for non-hazardous disposal at DADS. Therefore the Field Rep is not expected to stop work for laboratory analysis when these types of soils are encountered, unless in his/her judgment the chemical encountered is sufficiently concentrated (e.g. free product) or different that additional observation or characterization is warranted.

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All necessary field-based characterization and laboratory analyses will be performed by the contractor and a qualified environmental laboratory. Laboratory analysis and followup landfill approval can take up to 5 days total, and the Contractor should prepare for instances where a lined container must remain on the project while the excavation continues.

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4.54 Liquid Waste Management

Ground water is expected to be encountered in the lower half of the Project. Dewatering will be necessary and this is permitted through the Colorado Department of Public Health & Environment (CDPHE). The City currently maintains a Remediation Activities Discharging to Surface Water Permit. This permit will be transferred to the contractor once a contractor has been selected. The contractor shall be familiar with the permit and be prepared to treat for metals, solvents, and other parameters that are expected to be required per the permit. The contractor will plan for and be familiar with the dewatering operation, which is expected to involve pumping into frac tanks, onsite treatment, periodic sampling and analysis, and discharge into a storm sewer.

It is not expected that liquid wastes will require significant treatment or management beyond what is required in the CDPHE permit, nor require hauling or disposal offsite. Soil that is saturated with ground water is expected to contain low levels of chlorinated solvent; however, a DADS representative has indicated that the concentrations, particularly after distributed into soils, are assumed to be negligible and subject to volatilization, and thus not required to have further management or waste profiling unless new information comes to light during the Project.

4.65. Methane Detection and Mitigation

Methane is an odorless gas which is a byproduct of decomposing organic matter. It is lighter than air, and dissipates in the open air, but presents an explosive hazard at concentrations between 5% and 15% in air. A particular danger is its buildup in poorly ventilated spaces. The Lower Explosive Limit (LEL) is the concentration where there is enough methane to present an explosive hazard. For methane the “%LEL” is 5, meaning 5% methane in air is an explosive hazard.

(The Upper Explosive Limit (UEL) is 15%, beyond which the concentration is too "rich" to present an immediate hazard, but realistically the LEL will be encountered and responded to long before any consideration of UEL.)

When excavating within the landfill, or, at the Field Representative's discretion, near suspected landfill boundaries, methane meters shall be used. These will include a hand held device equipped with a pump, (such as a "4 -gas" meter or "methanometer") and used by the Field Rep, as well as personal, clip-on type devices (such as a GP-01 manufactured by RKI Instruments) worn by at least two members of the onsite contractor(s). The amount of clip -on devices worn and numbers of subcontractors participating will be at the discretion of the Field Rep but is expected to be a minimum of 2 people deemed to be potentially most exposed or working in the most confining space at any particular time.

The Work Supervisor, the Field Rep, and contractors working in the trench will be familiar with the operation of methane meters and understand the hazards of methane. The contractor will have at least two portable, spark -proof, weather-proof fans onsite, and a power source as needed, that can be brought online quickly to dissipate methane gas. The fans should also have the ability to connect to flexible hoses which can be used to direct air down into the excavation, for rapid air displacement.

It is anticipated that the installation of the box culvert along the alignment may potentially create a "confined space" per OSHA definition. The contractor should plan for continuous ventilation of this feature during installation to avoid methane buildup.

The Field Rep shall document methane readings from all methane meters at least every 30 minutes. 10% of a threshold concentration in air is a generally accepted industrial hygiene principal and generally requires further evaluation of a hazard before proceeding. If any of the readings are over 10% of the LEL (that is, 0.50% total concentration of methane in air), the following steps shall be taken:

- Project stopped, machinery shut off, and all personnel evacuated outside -of the exposure (> 10% LEL) area.
- Work Supervisor and Project Monitor notified.
- The Supervisor and Field Rep will confer onsite and agree on appropriate steps, which may include engineering controls to dilute the methane concentration to yield below less than 10% LEL.
- Readings shall be taken again no sooner than 10 minutes after initial exceedance was reported. If readings are below 10% LEL, work may re-commence.
- In the unlikely event that readings continue over 10% LEL even with engineering controls, the Project team shall meet and agree on appropriate next steps in writing before work re-commences. Next

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steps may or may not include: installation of more permanent venting/mitigation and monitoring measures in the immediate area of the hazard, and/or excavation along a different area of the Project until mitigation measures are agreed upon and deemed effective.

4.76 Reduction of Contaminant Spread

Contaminants may spread from the active work area to surrounding areas through a variety of mechanisms which include (but are not limited to): migration of dust containing chemicals, movement of particulate matter in water, and physical removal from the site on worker's clothing, work vehicles, or other direct mechanisms. Every effort will be made by the Operator to prevent the spread of contaminated or potentially contaminated materials from the controlled area. The Operator's Site-specific Health and Safety Plan will provide guidelines to prevent the spread of contamination or potentially contaminated materials from the work area.

Decontamination procedures can be used to prevent the spread of contamination from the work area. Proper decontamination procedures for personnel and heavy equipment will be followed. The procedures will depend upon the level of personal protective equipment employed, and the types of materials encountered during the performance of the work. In general this will mean that personnel will wear disposable nitrile gloves and booties over their work clothing when coming into contact with known or suspected chemical contaminants.

Back-hoe buckets and other exposed components of heavy equipment will be rinsed off into the excavation where the contaminants are already inherently present, before proceeding into less-suspect areas. The need and degree of rinsing will be at the discretion of the Field Rep.

Although not anticipated to be common, the Field Rep, in rare cases (such as when dealing with a previously undocumented, hazardous type of contaminant), may request that wash-water or other materials generated during the decontamination process be properly containerized, and disposed into drums or other containers for special disposal.

Proper asbestos decontamination procedures for personnel, sample equipment, and heavy equipment are described in Appendix A.

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